Cornell Cooperative Extension | Cornell Vegetable Program

VEGEdge

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Volume 19 • Issue 14 • July 13, 2023

Understanding and Preventing Herbicide Drift

Lynn Sosnoskie and Vipan Kumar, Cornell; Mike Hunter, Cornell Cooperative Extension; and Thierry Besançon, Rutgers

To achieve effective weed control, herbicides need to be deposited onto their intended targets, be it soil (in the case of soil-applied herbicides) or unwanted vegetation (in the case of foliar-applied herbicides). When herbicides are diverted, like through drift events, weed control potential is reduced and the possibility of unintended injury to nontarget species increases.

Herbicide spray or physical drift occurs when herbicide-containing droplets are physically moved on wind currents and deposited outside the projected target area. This occurs at the time of herbicide application or very soon after. High wind speed, low relative humidity, high temperatures, small droplet size, and spray boom maintained high above the ground or target crop canopy are some factors that increase the risk of spray or particle drift.

Herbicide volatility or vapor drift occurs when herbicides vaporize after application, mix freely with the air, and then move off-target with air currents. Volatility can be affected by environmental factors (such as temperature, humidity, wind speed), soil and crop factors (such as soil moisture, crop canopy surface, etc.), and the chemical properties of the herbicide, in particular vapor pressure. The higher the vapor pressure of a chemical, the greater its tendency to volatilize. For examples, see Table 1.

Table 1. Vapor pressures for some commonly used herbicides. Less volatile chemistries are at the top of the table, more volatile chemistries are at the bottom.

Herbicide	Vapor Pressure (mmHg)
glufosinate (Liberty)	0.000000000009
glyphosate (Roundup)	0.000000098
2,4-D Ester	0.00000706
trifluralin (Treflan)	0.0000458
dicamba (XtendiMax)	0.0000125
clomazone (Command)	0.00014

2,4-D injury to grape. *Photo: Thierry Besancon, Rutgers*

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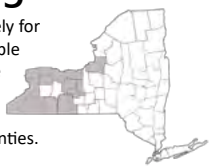
About VegEdge



VegEdge newsletter is exclusively for enrollees in the Cornell Vegetable Program, a Cornell Cooperative Extension partnership between Cornell University and CCE Associations in 14 counties.

The newsletter is a service to our enrollees and is intended for educational purposes, strengthening the relationship between our enrollees, the Cornell Vegetable Program team, and Cornell University.

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VegEdge is published 25 times per year, parallel to the production schedule of Western New York growers. Enrollees in the Cornell Vegetable Program receive a complimentary electronic subscription to the newsletter. Print copies are available for an additional fee. You must be enrolled in the Cornell Vegetable Program to subscribe to the newsletter. For information about enrolling in our program, visit cvp.cce.cornell.edu. Cornell Cooperative Extension staff, Cornell faculty, and other states' Extension personnel may request to receive a complimentary electronic subscription to VegEdge by emailing Angela Ochterski at aep63@cornell.edu. Total readership varies but averages 700 readers.

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The next issue of VegEdge newsletter will be produced on July 19, 2023.

Accumulated Growing Degree Days, 7/10/23

Julie Kikkert, CCE Cornell Vegetable Program

Accumulated Growing Degree Days (AGDD)
Base 50°F: April 1 - July 10, 2023

Location**	2023	2022	2021
Albion	1049	1122	1180
Appleton	984	1051	1087
Arkport	873	947	953
Bergen	980	1074	1089
Brocton	996	1100	1125
Buffalo*	1079	1109	1194
Ceres	827	906	970
Elba	949	1016	1038
Fairville	983	1031	1046
Farmington	1004	1048	1094
Fulton*	1007	1013	1052
Geneva	1060	1089	1131
Hammondsport	957	1043	1067
Hanover	963	1086	1106
Jamestown	875	950	975
Lodi	1106	1202	977
Lyndonville	998	975	1098
Niagara Falls*	1118	1162	1142
Penn Yan*	1045	1124	1195
Rochester*	1045	1105	1134
Romulus	1085	1116	1159
Sodus	1095	1142	1155
Versailles	953	NA	NA
Waterport	987	1038	1067
Williamson	933	1012	1033

* Airport stations
** For other locations: http://newa.cornell.edu

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How to Minimize the Risk of Spray or Vapor Drift

Knowing that herbicides have the potential to move off-target, what can growers do to minimize the risk of spray or vapor drift of their applications? Here are some suggestions.

1. Whenever possible, select nonvolatile or low volatility herbicides or herbicide formulations to minimize the risk of vapor drift. For example, the ester formulations of some growth regulators, such as 2,4-D, are more volatile and prone to vapor drift than the amine or choline salts.
2. Carefully read the herbicide label. The product label will provide information regarding when it is not safe to apply based on various environmental parameters such as wind speed, temperature, humidity, and rainfall events. Some herbicides (e.g., trifluralin) may need to be incorporated into the soil to limit the risk of product loss due to volatilization. You may also find information on buffer requirements when spraying near sensitive downwind plants or information on the type of nozzle you must use for a specific herbicide or information on the cutoff dates for certain herbicide applications.
3. Select nozzles that produce large sized droplets while providing adequate coverage at the intended application rate and pressure. The larger the droplet, the faster it will fall and be less exposed to wind; this will help the herbicide to reach its target. If applicable, consider the use of specifically designed drift-reduction nozzles (e.g., drift-guard or air induction types) and select an operating pressure capable of producing coarse to ultra coarse spray droplet sizes. Always calibrate spray equipment to ensure accurate application rates and minimize the formation of fine droplets.
4. Pay attention to the position of your boom and wind speed at the boom height; greater boom heights or higher wind speed at boom heights may increase the chance for herbicides moving off target. You may want to consider using a shielded boom when spraying herbicides that are prone to drift. Keep in mind that post-emergence herbicides will provide optimal weed control when applied in a timely manner with regards to crop and weed development (see the maximum weed size for each weed species on the label). While you are at it, follow label recommendations regarding travel speeds to reduce drift potential.
5. Use spray additives as recommended by the herbicide label to reduce the production of fine droplets. Consider the use of drift reducing agents (DRA) or volatility reducing agents (VRA) that reduce drift by increasing the viscosity or surface tension of a spray solution. While research shows that some drift retardants may help under select conditions, the prevention of herbicide drift should primarily rely on nozzle selection, boom height, application pressure, and environmental conditions. Remember that drift retardants reduce drift, not eliminate it.
6. If the application conditions aren't right, stop spraying. Do not apply herbicides when wind is blowing towards sensitive plants or when wind speeds exceed 10 mph. Do not spray under low humidity conditions or if heavy rainfall event is in the forecast (especially for volatility prone herbicides such as dicamba). Ideal spray conditions are when wind speed is between 3 and 10 mph. Low winds (< 3 mph) tend to be unpredictable and variable in direction and may indicate conditions that support a temperature inversion.
7. Do not apply herbicides when a temperature inversion occurs. A temperature inversion occurs when warm air rises upward into the atmosphere and cool air settles near the ground, preventing the mixing of air layers. In normal atmospheric conditions, air moves vertically, allowing for the dispersion and dilution of herbicide spray droplets. During a temperature inversion, the inversion layer acts as a lid, preventing the upward movement of air and reducing vertical dispersion. As a result, herbicide spray droplets remain concentrated in a shallow layer close to the ground. To confirm the presence of an inversion, measure the air temperature at 6 to 12 inches above the ground or the top of a nearly closed-crop canopy, and at a height of 8 to 10 feet above the surface to be sprayed. When the temperature at the higher level is greater (e.g., warmer) than the temperature at the lower level, an inversion exists. The greater the temperature difference between the two levels, the more intense the inversion.
8. Spray when temperatures remain below 80°F to minimize vaporization and droplet evaporation. This will minimize vapor drift but also help with weed control by preventing spray droplets from evaporating before reaching the target.
9. Leave a buffer zone between treated fields and sensitive plants. Herbicide labels may specify the width of the buffer zone. The buffer zone will allow larger droplets to settle before reaching sensitive plants. The buffer zone may not be effective in settling small droplets.

Remember that all herbicides are capable of drift, no exception.

When spraying a pesticide, the applicator has a legal responsibility to prevent it from drifting onto neighboring crops and sensitive areas. Always monitor weather conditions and their evolution carefully when spraying an herbicide. Overall, do not spray if all conditions are not suitable, and stop spraying if conditions change and become unsuitable. ●

Mid-July/Early Bulbing Signals Onset of Diseases in Onion

Christy Hoepting, Cornell Cooperative Extension, Cornell Vegetable Program

During the month of May and through June, weed control and killing of barley nurse crops is top priority in onion. Mid-June is consumed with monitoring for Botrytis leaf blight (BLB) halo lesions and onion thrips and applying fungicides and insecticides when this disease and insect pest reach appropriate spray thresholds. Although BLB halos and especially onion thrips continue to be important for the remainder of the growing season, it is in mid-July when onions start to bulb that all kinds of afflictions begin to appear. These include BLB necrotic spots, bacterial diseases, Fusarium basal rot and Iris yellow spot virus.

Botrytis Leaf Blight Necrotic Spots

BLB necrotic spots are yellow to yellowish-white round spots with a defined border that range in size from pin-prick to 1-2 mm (Fig. 1). They usually first appear in mid-July in direct seeded onions and increase in prevalence though August. The fungicides that are used to control them are often different than those used to control BLB halo lesions.

Figure 1. Botrytis leaf blight (BLB) "halo" spots (blue) and "necrotic" spots (yellow) on onion. *Photo: Christy Hoepting, Cornell Vegetable Program*

Bacterial Diseases

The first foliar symptom of bacterial disease in onion is the collapse of a middle-aged leaf, not the outer-most leaf or the inner-most leaf, but a leaf in-between (Fig 2). The collapsed leaf can appear white, light yellow or brownish in color (middle) or be "greasy"/water-soaked in appearance. Often, this leaf dries up and sloughs off before bacterial infection enters in the neck or the bulb (Fig 3). Alternatively, foliar symptoms of bacterial disease may progress and multiple leaves become affected (Fig. 4). Often, when it reaches this stage, the bacterial infection eventually will make its way into the bulb and cause bulb rot. There is a much better correlation between incidence of foliar symptoms affecting multiple leaves and bulb rot then there is between single leaf infections and bulb rot. Application of bactericides are generally not very effective if at all for controlling bacterial disease of onion.

Figure 2. First foliar symptom of bacterial disease of onion: a single middle-aged leaf is collapsed which may be white (left) or greasy (right) in appearance. *Photos: Christy Hoepting, Cornell Vegetable Program*

Figure 3. Collapsed inner leaf of onion caused by bacterial disease dries up instead of progressing into multiple leaves and into the bulb. *Photo: C. Hoepting, CCE Cornell Vegetable Program*

Figure 4. Foliar symptoms of bacterial diseases of onion, affecting multiple inner leaves, which can be white (left) or yellowish-brown (right). At this stage, the bacterial infection has usually already moved into the neck and is on its way to infecting the bulb. *Photos: Christy Hoepting, CCE Cornell Vegetable Program*

Fusarium Basal Rot

Foliar symptoms of Fusarium basal rot (FBR) include uniform and excessive leaf dieback. It usually does not affect every plant and can easily be distinguished from its healthy neighbors (Fig. 4). To confirm FBE, pull up the plant and look at the basal plate of the bulb. Often, the roots rot off and the bulb feels squishy and has a brownish squishy rot. When the bulb is cut in half longitudinally, the basal plate has a brownish or grayish-brown discoloration (Fig. 5). Foliar-applied fungicides are not effective to control FBR. Red varieties tend to be more susceptible than yellow varieties.

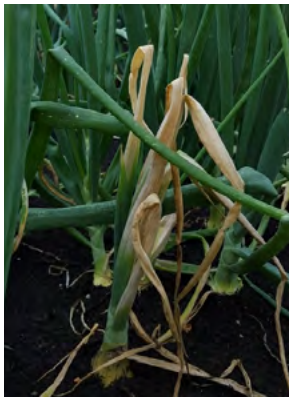

Figure 5. Foliar symptoms of Fusarium basal rot appear as a uniform dieback of the foliage. What is diagnostic is that the surrounding plants appear healthy. *Photo: Christy Hoepting, CCE*

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Figure 5. Onion bulbs infected with Fusarium basal rot have a brown and corky squishy rot and often the roots rot off (left). When the bulb is cut in half, the basal plates may exhibit a gray to brown discoloration (right). *Photos: C. Hoepting, CCE*

Iris Yellow Spot Virus

Foliar symptoms of Iris yellow spot virus (IYSV) first occur the middle-aged leaves of the plant. Lesions tend to be white in color, elongated and often occur along the edge of the leaf. Multiple lesions tend to be off-set from each other (Fig. 6). IYSV is vectored by onion thrips and is favored by plant stress. Excellent control of onion thrips is the first line of defense for managing IYSV. IYSV will not result in bulb rot, but often reduces bulb size.

Figure 6. White elongated necrotic spots of Iris yellow spot virus first appear on the middle-aged leaves of onion, often along the leaf border and off-set from each other. *Photo: C. Hoepting, CCE*

Sweet Corn Pheromone Trap Network Report, 7/11/23

Marion Zuefle, NYS Integrated Pest Management Program, Cornell; https://sweetcorn.nysipm.cornell.edu/

Statewide, Twenty-four sites reported this week. One of the sites had European corn borer (ECB)-E and two sites had ECB-Z. Fourteen sites reported corn earworm (CEW) with ten high enough to be on a 4, 5 or 6 day spray interval (see table at bottom of post). Fall armyworm (FAW) moths were caught at two sites and Western bean cutworm (WBC) was caught at twelve sites. The hybrid ECB moth was only caught at the Geneva site.

Western bean cutworm numbers are beginning to go up this week with peak flight expected late July into early August. It is important to begin scouting for egg masses even if cumulative trap catches have not reached 50, as egg masses have been found when cumulative trap catch was still in the single digits. WBC will usually lay eggs on the upper side of the top 1-3 leaves of pre-tassel corn, close to the leaf base. After tasseling has finished WBC seek out younger corn or dry beans. To scout for egg masses check the top 3 leaves of ten corn plants in ten locations throughout the field. The eggs are easy to observe if you view the leaf while holding it towards the sun. The egg mass will appear as a distinct shadow.

It takes between 5-7 days for eggs to hatch. It is critical that sprays are timed before the larvae have a chance to enter the ear. The egg mass will become purple in color approximately 24 hours before egg hatch.

WBC egg mass.

WBC eggs become purple prior to hatch. *Photo: Marlin Rice*

WNY Pheromone Trap Catches: July 11, 2023

Location	ECB-E	ECB-Z	ECB Hybrid	CEW	FAW	WBC
Batavia (Genesee)	0	0	NA	1	0	0
Bellona (Yates)	NA	NA	NA	NA	NA	NA
Eden (Erie)	0	0	NA	7	0	3
Geneva (Ontario)	0	0	1	1	0	0
Hamlin (Monroe)	4	0	NA	7	0	1
Leroy (Genesee)	0	0	NA	4	30	4
Lyndonville (Orleans)	0	0	NA	2	0	0
Oswego (Oswego)	0	0	NA	0	0	1
Panama (Chautauqua)	0	0	NA	3	0	3
Penn Yan (Yates)	0	0	0	0	0	0
Portville (Cattaraugus)	0	0	NA	0	0	0
Ransomville (Niagara)	0	0	NA	0	0	0
Stanley (Ontario)	0	0	0	1	0	1
Williamson (Wayne)	0	0	NA	0	0	NA

ECB: European Corn Borer; CEW: Corn Earworm; FAW: Fall Armyworm; WBC: Western Bean Cutworm

Average Corn Earworm Catch			Days Between Sprays
Per Day	Per Five Days	Per Week	
<0.2	<1.0	<1.4	No spray (for CEW)
0.2-0.5	1.0-2.5	1.4-3.5	6 days
0.5-1.0	2.5-5.0	3.5-7.0	5 days
1-13	5-65	7-91	4 days
over 13	over 65	over 91	3 days

Add one day to the recommended spray interval if daily maximum temperatures are less than 80°F for the previous 2-3 days.

CROP Insights

Observations from the Field and Research-Based Recommendations

GENERAL

Weather is highly favorable for disease development, both bacterial and fungal. – EB

BEETS

The early planted processing crop has excellent stands and growers have done a respectable job of managing weeds overall. Adequate rainfall across the region has most fields looking good. Seneca Foods reports that harvest may begin next week. I observed a small amount of bacterial leaf spot and Phoma leaf spot on some older leaves, but these should not cause an issue in plantings that will be harvested in July and August. I collected leaves on Monday that had some possible Cercospora lesions but am waiting for disease determination from Cornell AgriTech. – JK

CARROTS

Watch carrot fields for leaf spot diseases because of the recent humidity and prolonged periods of leaf wetness. Bacterial lesions are small yellow areas on the leaflets with brown, dry centers which are often surrounded by a yellow halo. Copper is labeled for Bacterial leaf blight. Cercospora leaf spot, caused by the fungus *Cercospora carotae*, is prevalent during hot and humid weather. Cercospora lesions are small, circular, tan or gray spots with a dead center which appear along the leaf margins causing them to curl. The Cercospora fungus attacks younger leaves. Alternaria leaf blight caused by the fungus *Alternaria dauci*, first appears as dark brown to black irregular spots on the margins of the leaflets. Lesions on petioles and stems are dark brown and girdle the stems, killing them. As the disease progresses, entire leaflets may shrivel and die. Lesions are more prevalent on older foliage. There are several fungicides labeled for carrot as outlined in the 2023 Cornell Vegetable Guidelines. Choices should be based on which disease(s) you are trying to control, cost, and PHI. – JK

COLE CROPS

Saw a case of white mold taking out heads in cabbage. Apparently, we had conditions in some areas for an earlier than usual infection window. Advise scouting fields with known histories.

Swede midge damage is becoming visible on unprotected plantings. – EB

CUCURBITS

Reports of downy mildew in Crawford and Warren Counties, PA. Get your protectants (Bravo or generic, esp.) on now, especially in Chautauqua, Cattaraugus, Allegany, Erie and Wyoming counties.

Seeing plenty of angular leaf blight, more so on cukes and cantaloupe than other crops. Bacterial leaf spot is present as well, seeing more on the winter squashes and pumpkins. Treatment is similar for both diseases so mix up a tank of your favorite copper at the high label rate and treat all your vine crops. Squash bug activity picking up. – EB

Striped cucumber beetles are active in cucumbers, melons, and squash. Check for these black-and-yellow beetles hiding in flowers and on leaf undersides. Feeding results in small, ragged holes in flowers and leaves. As they feed, cucumber beetles transmit the bacterium that causes bacterial wilt. This wilt first causes petioles and leaves to wilt, followed by the rest of the plant. Cucumbers and melons are most susceptible, particularly before the 5-leaf stage when plants are growing rapidly. For control in organic production, consider azadirachtin or kaolin clay products. A variety of natural enemies may also prey on cucumber beetles including tachinid flies, parasitoid wasps, and commercially available beneficial nematodes such as *Steinernema riobravi*. Options for conventional foliar sprays include Assail 30SG (Group 4A) and Baythroid XL (Group 3A). Admire Pro (Group 4A) can be applied through drip irrigation, though using this product at-planting reduces pollinator exposure compared to application through drip irrigation. – SC

DRY BEANS

Mexican bean beetle (MBB) adults are starting to feed in dry beans. Once in a field, MBB can quickly defoliate plants. Treatment should be considered when there is 30-40% defoliation pre-bloom, or greater than 15% defoliation during pod-fill stages. Leafhoppers are showing up in dry beans, but Cruiser applications should continue to protect against damage. The presence of nymphs will indicate when the Cruiser application is no longer working. Earlier planted fields are starting to enter bloom, so white mold management should now be considered. An initial application of Omega 500F is recommended followed by a second application of Endura 70 WDG. The first application should be made at the early bloom stage. – ML

GARLIC

Into harvest stages or rapidly approaching. See last week's article regarding eriophyid mite control practices during drying. – EB

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LETTUCE AND GREENS

In the Finger Lakes region, several plantings of greens including Swiss chard and brassicas have had a resurgence of flea beetles. A mid-spring attack (as usually seen) of flea beetles have come and gone but what looks like a new population of flea beetles in high numbers are appearing in new plantings of chard and various brassica greens. Growers have reported that they normally don't have much trouble with flea beetles with their second plantings, but this season seems to be different.

Mustard Greens – white rust has shown up in another brassica crop. This disease is rare and has shown up mainly in the fall in some plantings. The disease, as the name implies, resembles a white dusty coating on leaves with fine dots heavier looking than powdery mildew. It may be seed born but once it shows up, it is hard to get rid of and can last in the plant debris and soil for a few years. Long rotations out of brassicas and a physical distance removal of new crops from old plantings can help reduce recurrence. Drier conditions can knock back the disease. Rogue out infected plants. – RH

ONIONS

Most of the direct seeded onion crop is bulbing now and earliest planted early-maturing varieties of transplanted onions have just begun to lodge. Although rainfall has not been evenly distributed across the region, none of the onions are water-stressed at this time. This is excellent because adequate rainfall/irrigation is critical during bulbing to achieve maximum bulb size at harvest. Unfortunately, some fields have had too much rain and have patches of onions suffering from standing water/saturated soil conditions. Onion thrips pressure generally has remained low this week and thrips are being controlled very well by Movento. The majority of onions found in onions treated with Movento at this time are adults, because Movento does not control the adults. No or few nymphs is an indication that the Movento is working very well. In the majority of cases, residual control of onion thrips with Movento will last for 1-2 weeks before another insecticide spray has to be made. Bacterial disease showed up or increased in fields where it was already present over the past week, with highest incidences appearing to be correlated with wet field conditions, as bacterial diseases thrive in hot and wet conditions. In most cases, only a single leaf is affected at this time. Often, such infections dry up and the plant grows free of bacterial disease. Several bactericide trials have been conducted recently as part of the Stop the Rot project and the majority of them have found bactericides to be ineffective for controlling bacterial diseases in onion. A quick summary of this work can be found at the Stop the Rot page of Alliumnet: https://alliumnet.com/frequently-asked-questions/do-bactericides-work/. Fusarium basal rot and Iris yellow spot virus were also detected this past week – see article on page 4 for more information on afflictions of onion that show up during mid-July/early bulbing.

Mid-July/early bulbing is also the time of year when Stemphylium leaf blight (SLB) of concern. Although this year in Elba, we have been seeing it for a couple of weeks already as it has been following storm injury from an event that occurred a couple of weeks ago. For the most part SLB appears to be secondary at this time but has become primary in a couple of fields. Spray decisions are very tricky in this moment as growers are diligently trying to minimize the number of FARC 3 fungicide applications to no more than two per season. Bravo 3 pt +/- FRAC P07 fungicide has been an excellent choice to keep SLB secondary in fields that are not getting any Movento. Some fungicide choices that growers have made for SLB with Movento include: Scala + Rovral, mancozeb + Rampart, Oso + Rampart, or Miravis Prime + Rovral. And, some growers are choosing to put out their first FRAC 3 + 3 fungicide spray this week. And some growers have applied Movento and Bravo in separate passes. Ideally, SLB fungicide program should start just before tipburn begins. See articles on SLB management in last 2 issues of VegEdge for more information. Also, the Cornell Onion Fungicide Cheat Sheet is available online at the CVP website: https://rvpadmin.cce.cornell.edu/uploads/doc_1139.pdf. – CH

Late Blight Risk Chart, 7/12/23

Location	Blight Units 7/5-7/11[1]	Predicted Blight Units 7/12-7/14[2]
Albion	0	6
Arkport	24	35
Baldwinsville	0	6
Bergen	5	11
Brant	29	36
Buffalo	13	30
Burt	-	-
Ceres	34	50
Dansville	35	54
Elba	17	23
Fairville	25	32
Farmington	31	37
Fulton	42	55
Geneva	18	25
Hammondsport	22	32
Knowlesville	6	12
Lyndonville	10	22
Medina	5	11
Niagara Falls	12	25
Penn Yan	33	52
Rochester	22	34
Sodus	33	40
Versailles	23	29
Wellsville	39	53
Williamson	22	28

Calculated using a May 31 crop emergence date. Last fungicide application July 5 on susceptible cultivar Reba. Numbers in red indicate locations that have or will surpass the 30 BUs needed to trigger a fungicide application.

1 Past week Simcast Blight Units (BU)

2 Three-day predicted Simcast Blight Units (BU)

PEAS

Harvest of the processing pea crop continues with no major insect or disease problems reported. The biggest issue so far has been weed escapes in fields that did not receive enough moisture to activate pre-emergence herbicides. – JK

PEPPERS

Bacterial leaf spot of pepper is flaring up in several locations across a broad geographic area. Can be difficult to control while weather conditions remain favorable, well-suppressed if weather cooperates. High rate copper +/- standard rate of mancozeb, Tanos, and Actigard are reported as useful. Note Actigard is best as a protectant and fits in scenarios where the majority of a planting/field is not yet showing symptoms. – EB

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POTATOES

Colorado potato beetle adults and larvae are still very active in some fields. Continue to monitor numbers to control when needed. Chemical control should be considered when beetles exceed the thresholds of 25 adults, 75 large larvae, or 200 small larvae per 50 vines.

This week's late blight forecasting indicates that Ceres, Dansville, Farmington, Fulton, Penn Yan, Sodus, and Wellsville have reached the 30 blight units (BU) needed to trigger a spray for late blight this week, with a few others forecasted to reach the threshold by the end of the week. See the Late Blight Risk Chart on the previous page. On a national level, no late blight has been reported this year. – ML

SWEET CORN

A reminder to get bird deterrents out well before the birds find ripening corn. We continue to test the University of Rhode Island laser scarecrow URI Laser Scarecrow (google.com) on local farms. While the device does deter certain bird species such as black birds and starlings, some growers find it a fit for their operation and others do not. For those of you who purchased a laser scarecrow kit from URI, Julie Kikkert is a local resource who can help troubleshoot the device. There are no more kits available for purchase this year. Julie may have one or two devices available to loan out this year. See her contact information on the backpage of VegEdge. – JK

HIGH TUNNEL

Brown Leaf Mold (caused by the name changing fungus currently known as *Passalora fulvarum*) can be found in high tunnels and greenhouses growing susceptible varieties. Symptoms are pale green to yellowish spots on the upper leaf surface with an olive green to gray mold underneath. In severe outbreaks the fungal growth can be on the upper surface. Brown Leaf Mold is almost always a greenhouse and high tunnel disease. The best management method is to grow resistant varieties. These include Primo Red and Red Deuce (determinates), Big Dena and Rebelski (indeterminates). Heirloom varieties are particularly susceptible. If one of the susceptible varieties must be grown for market reasons, the inclusion of some resistant varieties in the high tunnel can diminish total infection. Regular pruning and ventilation are the next management steps. In some cases growers may choose to spray. Organic options include copper materials (0 day pre harvest interval). Other fungicides to consider include Revus Top (FRAC groups 3 and 40 with a 1 day PHI) and Tanos (FRAC groups 3 and 11 with a 3 day PHI). Remember that in New York, the crop and disease must be listed together on the label, and there must not be a greenhouse prohibition. This applies to high tunnels as well. – JR

Despite excellent pruning and trellising, leaf mold symptoms are visible as light-yellow circular spots on the lower leaves of this high tunnel tomato crop. *Photo: Judson Reid, CCE*

A disease that is far more common than Brown Lead Mold is Gray Mold. Gray Mold is caused by the ubiquitous fungus Botrytis cinerea. This disease abounds where there is dead tissue and high moisture. Once an outbreak begins in a greenhouse, the disease overtakes healthy green tissue including fruit. Often infections will begin underneath the calyx where moisture and spores conspire to rot. Maintaining crop nutrition can reduce outbreaks by minimizing flower drop and tissue senescence. Conversely, excess nitrogen levels can increase Gray Mold by creating excess foliar growth, increasing canopy humidity. Decree 50 WG (FRAC group 17, 0 day PHI) is a common ornamental greenhouse fungicide with a specific tomato label for Botrytis indoors. There is a limit to two (2) consecutive applications and the material may not be used on field tomatoes. Similar to Brown Leaf Mold, Revus Top and Tanos are also permitted applications for high tunnel and greenhouse tomatoes.

We've included three photos to demonstrate how infections look on different plant parts: flowers, foliage, and fruit. – JR

Dead flowers are often the beginning of a Gray Mold outbreak. The dead tissue is easily colonized by the fungus. Dead flowers are often an indicator of nutritional deficiency.

Gray mold on foliage presents light brown necrosis with circular patterns. Easily confused with Early Blight, lesions are lighter in color, and may or may not sporulate.

Major yield loss can occur once Gray Mold infects fruit. Infections often begin under the calyx, creating a soft rot with gray spores. Reducing relative humidity through ventilation and pruning is critical. *Photos: J. Reid, CCE*

Angular Leaf Spot on Vine Crops

Robert Hadad, CCE Cornell Vegetable Program

Vine crop leaves with angular leaf spot. The disease starts as small spots the spread into the leaf turning darker. Often the infection moves inward in an angular fashion destroying leaf tissue rapidly. The decaying tissue dries out and drops away leaving the leaf with a shredded appearance. *Photo: Margaret McGrath, Cornell*

Angular leaf spot (ALS) on vine crops (mainly cucumber, melon, and summer squash) is one of the diseases that can blow up quickly where there are warm temperatures, wet ground from rains or dews from cooler nights. Once it shows up, frequent rains can splash-spread the disease easily across a field.

A good defense is a strong offensive. ALS can be seed-born. Select varieties that are labeled resistant. If growing transplants, look for symptoms on the seedlings such as small dark dots with a lighter shade halo around them, a slightly sunken area paler in color with dark spots, or patches of enlarging spots. Rogue these out along with seedlings surrounding them. Splashing water will spread the disease so go easy on the watering. Consider switching to a misting nozzle.

In the field, try to avoid planting vine crops in large groupings. Alternate rows, or several groups of rows with alley ways or non-susceptible crops. This will help in reducing spreading through splashing. When scouting fields, avoid walking through the rows when the leaves are wet. You can spread the disease if pants become contaminated.

A strong crop rotation is also essential. It isn't enough to just move vine crop plantings over to the right or left, or up and down from the current year's planting. Moving future plantings to more distant parts of the farm would be more helpful. If you have multiple fields of vine crops, wait till the leaves are dry before moving equipment from one field to another. As soon as a crop is finished, quickly turn under the old plants into the soil for quick decomposition. The disease can survive on the vines left on the soil surface.

Since this is a bacterial disease, there are limits to what is available to spray. Copper products help, like the mix of copper with mancozeb. Due to the worry of building up resistance, using alternative sprays such as some of the general bacterial disease managing biopesticides would be useful. ●

Upcoming Event

WNY Vegetable Field Walk

July 19, 2023 (Wednesday) | 6:00 pm - 8:00 pm
Johnson Creek Produce, 12625 Roosevelt Hwy, Lyndonville

Walk from crop to crop, learning hands-on pest, disease and weed ID and scouting techniques. IPM control tactics for both preventative and reactive management will be discussed in group dialogues. 2.0 DEC credits offered (categories 1a, 23).

Cornell Cooperative Extension
Cornell Vegetable Program

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VegEdge is the highly regarded newsletter produced by the Cornell Vegetable Program. It provides readers with information on upcoming meetings, pesticide updates, pest management strategies, cultural practices, marketing ideas, and research results from Cornell University and Cornell Cooperative Extension. VegEdge is produced every few weeks, with frequency increasing leading up to and during the growing season.

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